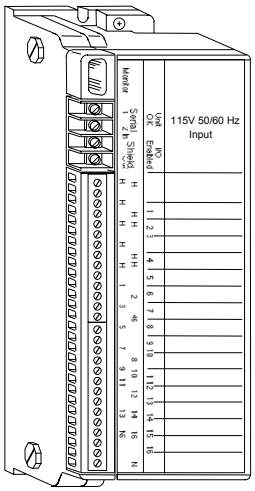
115VAC 16-Circuit Discrete Input Block

June 2002 GFK-0037F

Description

The 115VAC Discrete Input Block (IC66*BBD110) is an intelligent, configurable module that provides an interface to 115VAC discrete input sensors. The block has sixteen 115VAC circuits - two banks of eight circuits each.

Typical inputs to this block are contact closures from switches, pushbuttons, or limit switches. The block can be used with both 2-wire and 3-wire proximity switch inputs. Control power for the block comes from the power line that supplies the inputs. No separate block power supply is needed.



Features

Block features include:

- Selectable thresholds
- Advanced diagnostics

Software Configurable Features

The 16 Circuit 115 VAC Input Block provides configurable detection of Open Wire and Shorted Wire faults. Selectable thresholds extend the use of Open Wire and/or Shorted Wire diagnostics to circuits with many types of input devices and sensors.

- There are separate On/Off thresholds for each group of eight inputs. On/Off thresholds are configurable from 25% to 85% of the incoming line voltage, allowing the use of a wide variety of input sensors.
- Optional Open Wire detection can be selected for individual inputs. The Open/Off threshold can also be configured at 25% to 85% of the incoming line voltage. Separate Open/Off thresholds can be selected for each group of eight inputs.
- Optional Short Circuit detection at 10% and 90% of the incoming line voltage can also be selected for individual inputs.

For most applications, the default thresholds and recommended resistor values are not changed.

Fault reporting can also be enabled or disabled circuit-by circuit.

Specifications

Catalog Numbers	
Block type	16 circuits, inputs only
Block	IC66*BBD110
Electronics Assembly	IC66*EBD110
Terminal Assembly	IC66*TBD110
Block Specifications	
Size (height x width x depth)	8.83" (22.44cm) x 3.34" (8.48cm) x 3.91" (9.93cm)
Weight	4 lbs. (1.8 kg)
LEDs (I/O Block)	Unit OK, I/O Enabled
LEDs (each circuit)	Reflect state of input (logic side)
Input to ground or serial bus Isolation	1500V
Heat Dissipation	28 Watts maximum with 16 inputs on at full current
Operating voltage (single source)	93-132VAC
Frequency	47-63 Hz
Required power (block only)	80mA max. block current plus 200mA max. input circuit current
Terminal board rating (input or feed-through current)	5.0 Amps
Power supply dropout time	1 cycle (16.7ms at 60Hz, 20ms at 50Hz)
Input Specifications	
Input off state, input on state	Programmable threshold (25% to 85%)
Input impedance (typical)	11.6K Ohms
Input open wire	Programmable threshold (25% to 85%)
Input shorted wire	Fixed 10%-90% thresholds
Input processing time (typ)	1ms (plus selectable filter time)
Selectable input filter times	10 to 100ms in 10ms increments
Input diagnostics	Open Wire, Short Circuit
Environmental Specifications	
Operating temperature	0° C to +60° C (+32° to +140° F)
Storage temperature	-40° to +100° C (-40° to +212° F)
Humidity	5% to 95% (non-condensing)
Vibration	5-10 Hz 0.2" (5.08mm) displacement, 10-200 Hz at 1G

Refer to GFK-0867 for product standards and general specifications.

Using this Datasheet

This datasheet summarizes information about block installation, configuration, and diagnostics.

Your primary reference should be the Discrete and Analog Blocks User's Manual. It includes detailed instructions for block installation and configuration.

For additional information about systems and communications, including bus specifications, refer to the *I/O System and Communications Manual*.

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Compatibility

This block is fully compatible with Hand-held Monitor model IC66*HHM501 only.

Installation Instructions

Carefully inspect all shipping containers for damage. If any equipment is damaged, notify the delivery service immediately. Save the damaged shipping container for inspection by the delivery service. After unpacking the equipment, record all serial numbers. Save the shipping containers and packing material in case it is necessary to transport or ship any part of the system.

Block Mounting

Genius I/O blocks are considered "open equipment" and therefore must be installed within a protective enclosure. They should be located in an area that is clean and free of airborne contaminants. There should be adequate cooling airflow.

The block can be mounted right side up, or upside down. Leave at least 2 inches of space between blocks. Mount the block by drilling two screw or bolt holes for 8-32 hardware. Position the block so that the notches in the upper and lower flanges line up with the mounting holes. Mount the block using 8-32 screws. Use star washers to provide ground integrity.

Grounding

The block's mounting screws must not be used as the only means of grounding the block. Connect the green ground screw on the block to a reliable ground system using a short wire lead, minimum size AWG #12 (avg 3.3mm^2 in cross-section).

Warning

If mounting screws do not make good ground connection and the ground screw is not connected to a reliable ground, the block is not grounded. Electrical shock hazard exists. Death or personal injury may result.

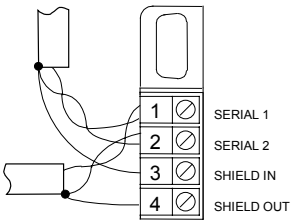
Block Wiring

Do not overtorque the terminal screws. Recommended torque for all terminals is 6 in/lb (.678 N/M).

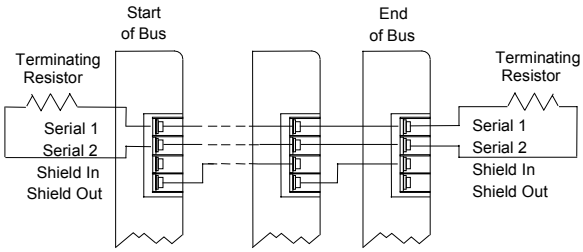
Serial Bus Wiring

Terminals 1 to 4 are for the serial bus. These terminals accept one AWG #12 wire (avg 3.3mm^2 cross-section) or two AWG #14 wires (each avg 2.1mm^2 in cross-section). The minimum recommended wire size is AWG #22 (avg .36mm^2 in cross-section). Terminals 1 - 4 can also accommodate spade or ring terminals up to 0.27 inch (6.85mm) wide with a minimum opening for a #6 screw, and up to 0.20 inch (5.1mm) depth from the screw center to the back barrier. Be sure unshielded wire ends are not longer than 2 inches (5 cm).

Using one of the cable types recommended in the *System and Communications User's Manual*, connect the serial bus to terminals 1- 4.

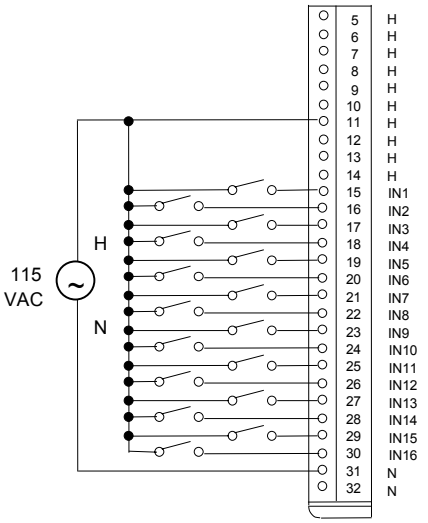


If the block is at either end of the bus, connect a terminating resistor of the appropriate type (see the System and Communications User's Manual for details) across its Serial 1 and Serial 2 terminals.



Field Wiring

Terminals 5 to 32 are for field devices. They take a single wire up to AWG #14 (avg 2.1mm^2 in cross-section). Minimum recommended size is AWG #20 (avg .54mm^2 in cross-section).



Run one signal wire for each device. Returns can be made to one or more of the H terminals; all H terminals are internally bussed, as are the N terminals. Extra power terminals are for convenience. Depending on layout and current loads, hot connections can be bussed together and made by one wire back to the block or power source. Neutral connections can also be bussed and made with one wire.

Power Source Wiring

Connect the hot side of a 115 VAC source to an H terminal and the neutral to an N terminal.

The power supply should not be fused higher than 5A.

Caution

Do not daisy-chain the power bus to other blocks or devices through the extra H and N terminals. These terminals are for wiring convenience only; using them as power distribution points may result in damage to the block.

Caution

Make all block power connection to the same 120 VAC phase. Other blocks can use different phases.

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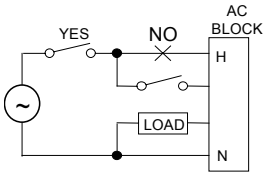
Power Disconnects

Since block power is the same as circuit power, it is important to wire block power disconnects so that block power and input power will be removed *at the same time*.



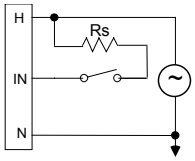
Caution

If I/O circuit power is not removed at the same time as block power, the block may power up when multiple inputs are activated, even though one leg of power has been removed from the block.

If you want to disable the block without removing power from input devices, use a Block Puller to unplug the Electronics Assembly. Do not disconnect H or N to remove power.

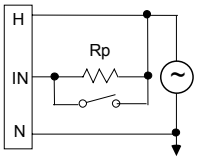
Wiring for Shorted Wire Detection

If a circuit will use the configurable Shorted Wire detection feature, it may be necessary to install a resistor in series with the input device. For the default thresholds and a dry contact sensor, use a 3.9K ohm resistor. If the thresholds are changed, the resistor value must be selected as described in the *Discrete and Analog Blocks User's Manual*. For some solid state sensors, additional external resistance may not be required. Consult the sensor manufacturer's specifications.

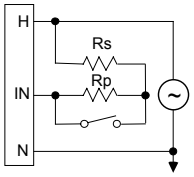


Wiring for Open Wire Detection

If a circuit will use the configurable Open Wire detection feature, it may be necessary to install a resistor across the terminals of the input device. For dry contact sensors, the default thresholds are not changed and a 22K ohm resistor can be used. If the thresholds are changed, a resistor must be selected as described in the *Discrete and Analog Blocks User's Manual*. For some solid state sensors, additional external resistance may not be required. Consult the sensor manufacturer's specifications.

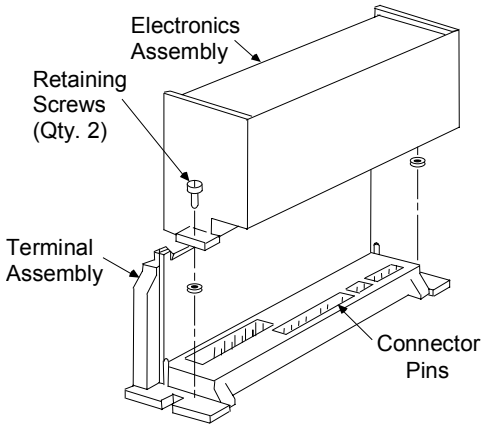


Open Wire and Shorted Wire diagnostics can be selected for the same input. The input circuit must then include both a series resistor and a parallel resistor to detect Open/Short conditions from a dry contact sensor. If the block's default thresholds will be used, use the resistor values given above.



Removing an Electronics Assembly

The block's Electronics Assembly can be replaced with a compatible model without removing field wiring or reconfiguring the block.



1. Unscrew the retaining screws at the top and bottom of the block.
2. Using a Block Puller (IC660BLM507), engage the tabs in the first vent slots. Move the tool to the center of the block and squeeze the handle.
3. Pull the Electronics Assembly upward.

Warning

If power is applied to the field terminals, power is also exposed on the connector pins at the base of the Terminal Assembly, and electrical shock hazard exists. Do not touch the connector pins! Death or injury may result.

Inserting an Electronics Assembly

1. Align the Electronics Assembly in the guides and push down firmly.

Caution

Do not exert excessive force; it may damage the block.

2. If unusual resistance is met, remove the Electronics Assembly. If power is applied to the block, DO NOT TOUCH THE CONNECTOR PINS! Inspect the Terminal Assembly, connector receptacle, and connector edge board (on the Electronics Assembly). Be sure the keying matches. Remove any obstacles and reinsert the Electronics Assembly. Pay close attention to the alignment of the guide pins.
3. Secure the Electronics Assembly with the screws on the top and bottom of the Terminal Assembly.

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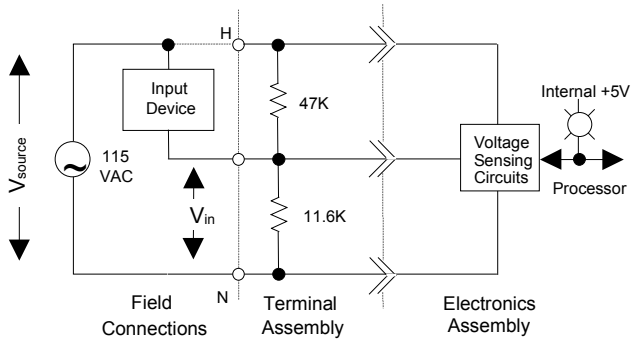
Block Operation

Each circuit has its own LED that indicates the presence of On/Off threshold voltage.



The block's input circuitry is resistive. The resistive load is sufficient to activate most 2-wire proximity switch devices. Input resistance is 11.6K Ohms, which provides a preload current of 9.9 mA at 115 volts.

LEDs

The Unit OK and I/O Enabled LED's show the operating status of the block.

Unit OK	I/O Enabled	Meaning
ON	ON	Block functioning, CPU communicating
ON	OFF	Block functioning No CPU communications for 3 bus scans
ON	Blinking	Block functioning, Circuit forced
Blinking	ON	Circuit fault, CPU communicating
Blinking	OFF	Circuit fault No CPU communications for 3 bus scans
OFF	Don't Care	No block power, or block faulty
Alternate Blinking		Circuit fault, Circuit forced
Synchronous Blinking		No CPU communications - block number conflict

Circuit LEDs indicate the presence of On/Off threshold voltage.

Diagnostics

Open Wire and Shorted Wire diagnostics can be enabled separately or together. Each requires the addition of a resistor at the input device as shown previously. The *Discrete and Analog I/O Blocks User's Manual* explains how to configure these diagnostics, and how to select the correct resistor for the application.

Open Wire: indicates an open wire from a sensor to the input terminals on a tri-state input. If this fault occurs, the block sets the input state to 0 in the CPU.

Shorted Wire: indicates a shorted wire to H or N. The block sets the CPU's input state to 1 if the fault is short high or 0 if the fault is short low.

Caution

A short between In and N may result in high fault currents when the input switch is closed. This may blow the line fuse or cause overheating of series resistor R_s.

Configuration

First, the block must be configured with a Hand-held Monitor to:

- Enter its Device Number (serial bus address).
- Enter its Reference Number (required only for IC600 and IC550 series PLCs only).

The rest of the features can be configured either using a Hand-held Monitor, or by sending a Write Configuration datagram to the block from the host.

Note: If a block is configured offline, it must be properly grounded and have a 75 Ohm resistor installed across its Serial 1 and Serial 2 terminals. See the *Discrete and Analog I/O Blocks User's Manual* for instructions.

Feature	Circuit or Block	Factory Setting	Selections
Device Number	Block	null	0 to 31 (a number must be selected)
Reference Address	Block	none	Depends on host CPU type
Baud Rate	Block	153.6 std	153.6 std, 153.6 ext, 76.8, 38.4 Kbd
Input Filter Time	8*	10ms	10 to 100ms
Open/Off Threshold	8*	25%	25-85%
On/Off Threshold	8*	50%	25-85%
Short Detect	Circuit	no	yes, no
Open Detect	Circuit	no	yes, no
Report Faults	Circuit	yes	yes, no
Configuration Protection	Block	disabled	enabled, disabled

* Set up separately for each bank of circuits (1 - 8 and 9 - 16)